

107E-5557-JWH
6 May 2004



Mr. Patrick Quinn
Missouri Department of Natural Resources
Hazardous Waste Program
1738 East Elm Street
Jefferson City, Missouri 63101

RE: Comments concerning the Interim Action Remedial Work Plan for the
McDonnell Douglas Facility, Hazelwood, Missouri, Permit #
MOD000818963

Encl: Revised Interim Action Remedial Work Plan, Solid waste Management
Unit 17, McDonnell Douglas, Hazelwood, Missouri

Letter from Tim Stallman of the Water Pollution Control Program dated
February 27, 2004

Dear Mr. Quinn;

Following is our response to your April 21, 2004 comment letter on the Interim
Action Remedial Work Plan for the McDonnell Douglas Facility.

General Comment

As stated in the plan, "Corrective Measures Study (CMS) will
subsequently be prepared for the Boeing Tract I Facility to evaluate the
need for additional remedial activities for soil and groundwater at the
Facility." Based on the current draft Risk Assessment, we believe that the
interim measure may treat the site to acceptable risk-based levels but this
is not the objective of the Interim Measure.

Specific Comment 1.

The Water Pollution Control Program was notified of the changes to the
injection permit but did not feel a permit modification was necessary.
Permission was granted to proceed with the additional use of HRC to treat
tetrachloroethylene. See enclosed letter.

Specific Comment 2.

This is a typographical error and has been corrected.

432240



RCRA RECORDS

107E-5557-JWH
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Specific Comment 3.

The monitoring included in the Interim measure Work Plan will take the site to the point where the CMS will be either completed or substantially underway, the CMS will address longer term monitoring.

Specific Comment 4.

Section 2.6 Soil Monitoring has been added to the work plan. Four soil borings will be installed approximately one year following injection. One soil sample from each of three depth zones in each boring will be submitted for laboratory analysis.

Specific Comment 5.

The figure has been revised to show building 51 and the pit area.

We would like to begin the Interim Measure project as soon as possible. Please contact me if you have any questions.

Sincerely,



Joseph W. Haake, Group Manager
Environmental and Hazardous Materials Services
Dept. GT64C, Bldg. 220, Mailcode S221-1400
(314) 232-6941

C: Ms. Jolęta Golik, Lambert-St. Louis International Airport
Ms. Demetra Salisbury, United States Environmental Protection Agency Region VII

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Bob Holden, Governor & Stephen M. Mahood, Director

www.dnr.state.mo.us

February 27, 2004

Mr. Elmer Dwyer
Environmental and Hazardous Materials
The Boeing Company
PO Box 516
St. Louis, MO 63166-0516

Dear Mr. Dwyer,

We received your letter dated February 10, 2004 informing us of your desire to use additional remediation chemicals at the Boeing Fabrication Facility (UI-0000020). You also requested us to add Tetrachlorethylene to the monitoring.

We do not feel that these two changes are significant enough to modify the permit. You may proceed with the additional use of Hydrogen Release Compound. On your final discharge monitoring report, simply add tetrochlorethylene to the other concentrations that you report.

Thank you for your letter. If you have any additional questions, please contact me at the Water Protection Program, PO Box 176, Jefferson City, MO 65102 or by telephone at (573) 751-7634.

Sincerely,



Tim Stallman
Environmental Specialist

TS:br

c: St. Louis Regional Office
Pat Quinn, HWP



Integrity and excellence in everything we do



INTERIM ACTION REMEDIAL WORK PLAN

Solid Waste Management Unit 17

**McDonnell Douglas,
Hazelwood, Missouri**

Prepared for:
The Boeing Company
St. Louis, Missouri



Prepared by:
MACTEC Engineering and Consulting, Inc.
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

MACTEC Project Number 32350035046

May 5, 2004

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- Figure 2 Facility Map, Interim Action Work Plan, SWMU 17, Boeing Tract 1, Hazelwood, Missouri
- Figure 3 Site Location Map, Interim Action Work Plan, SWMU 17, Boeing Tract 1, Hazelwood, Missouri
- Figure 4 Proposed HRC Injection Points, Interim Action Work Plan, SWMU 17, Boeing Tract 1, Hazelwood, Missouri

Geologist Certification



This Interim Action Remedial Work Plan, and Figures were prepared by or under the direction of Dennis L. Brinkley, Missouri Registered Geologist (#RG0895).

1.0 SITE INFORMATION

Solid Waste Management Unit (SWMU) 17 is located on the Boeing Tract 1 Facility and consists of a continuously paved area outside of Building 51 (Figures 1, 2 and 3) that was used for tank transfer activities involving recovered perchloroethylene (PCE). Boeing initially began using this unit for PCE recovery operations in 1993. The distillation unit was removed from operation in February 1998; Boeing no longer uses this area for PCE recovery purposes. During the Visual Site Inspection, evidence of past spills in the area where the 350-gallon portable tanks were filled was observed; additionally records indicated that maskant spills had occurred in the area during operation of the system. Asphalt around the transfer area was noted to be damaged.

The referenced waste management activities were used to recover PCE from maskant that was applied to sections of various metal parts. The maskant product was a mixture of rubber-like polymers in a PCE carrier or thinner. This paint-like mixture was applied to metal parts and allowed to dry. As the parts dried, the PCE evaporated and was captured in a vapor recovery hood. Vapors from the hood were discharged to a carbon adsorption unit, where the PCE vapors were separated from the air and then transferred to a condenser, where it was recovered. The recovered PCE flowed to a 55-gallon receiving tank that cycled it into the 750-gallon holding tank. Recovered PCE was then transferred from the 750-gallon holding tank into 350-gallon portable tanks for offsite shipment.

As part of an Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of the Boeing Tract 1 Facility, a total of 25 soil borings have been completed in the vicinity of SWMU 17 [RFI Study Area D(2)] to delineate the nature and extent of impact to the subsurface. A total of three monitoring wells and four piezometers (one subsequently closed) have been installed in the vicinity of SWMU 17. Soil and groundwater samples were selectively analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and total metals. Results of laboratory analysis indicated that VOCs, consisting primarily of PCE and PCE breakdown components [trichloroethene (TCE), dichloroethene, (DCE), vinyl chloride (VC)], were present in the soil and groundwater at SWMU 17. The results of the Draft Risk Assessment concluded that the concentration of PCE in groundwater in the area presented a potential risk to construction workers via direct contact with the groundwater.

2.0 INTERIM ACTION

As an interim action, Boeing will conduct an accelerated bioremediation of shallow soil and groundwater in an area encompassing the location of SWMU 17 (Figure 3). The objective of the interim action is to reduce the concentration of PCE and other chlorinated hydrocarbon constituents in the shallow soil and groundwater. A Corrective Measures Study (CMS) will subsequently be prepared for the Boeing Tract 1 Facility to evaluate the need for additional remedial activities for soil and groundwater at the Facility.

2.1 Technology Description

Chlorinated compounds can be naturally degraded through the process of reductive dechlorination. Chlorinated ethenes (PCE, TCE, DCE, and VC) are transformed by sequential dechlorination from PCE to TCE to DCE to VC to ethane (USEPA, 1998). The chlorinated compound is utilized as an electron acceptor, with a chlorine atom removed and replaced with a hydrogen atom. Because chlorinated compounds are utilized as electron acceptors during reductive dechlorination, an appropriate carbon source is required for microbial growth (resulting in the production of hydrogen) to occur. Potential carbon sources include low molecular weight organic compounds (lactate, acetate, methanol, glucose, etc.), fuel hydrocarbons, or naturally occurring organic matter.

Hydrogen Releasing Compound (HRC) is a proprietary polylactate ester manufactured by Regenesis, Inc. that is specially formulated for slow release of lactic acid upon contact with water in the subsurface environment. Lactic acid can be metabolized by native microbes to hydrogen, which is a suitable electron donor for the reductive dechlorination process.

Data collected during the RFI indicate that natural biodegradation of chlorinated compounds is occurring at the Facility, including the SWMU 17 area. An Enhanced Bioremediation Pilot Test was conducted at the Scrap Metal Recycling Dock at the Facility between June 2002 and January 2004 (MACTEC, 2004). The results of this pilot test demonstrated that the injection of HRC into the shallow groundwater successfully accelerated the dechlorination of TCE, DCE and VC in the groundwater. Nineteen months after the injection, TCE concentrations remained over 98 percent lower than prior to injection and DCE and VC concentrations continue to decline in the pilot test area. This indicates a reduction in chlorinated compound concentrations adsorbed in soil below the groundwater table, which would otherwise cause rebound of constituents by desorption.

2.2 Injection Permit

Boeing has an existing underground injection permit control permit (UI-0000020) issued by the Missouri Department of Natural Resources (MDNR). This permit was issued for the HRC pilot test conducted at the Facility. The MDNR Water Protection Program has determined that the Interim Measure will not require a modification of this permit, as long as analysis for PCE is added to the final monitoring.

2.3 Subcontractors

Boeing will contract with an environmental engineering firm using a Missouri Registered Geologist to provide project management for the interim measure. Documentation related to the interim measure will include initial and quarterly sampling reports. A drilling contractor familiar with the HRC application process will be retained to inject the material. Regenesis Inc. will provide the HRC-X (a slower release version of HRC) product and the technical support related to the application amount along with reviewing sampling analytical results. An off-site Environmental Protection Agency (EPA) and MDNR approved laboratory will perform all the required sampling analysis with the proper Quality Assurance/Quality Control (QA/QC) controls.

2.4 Injection Points

HRC-X will be injected in the shallow groundwater, between 4 and 19 feet below grade, in a 4,000 square foot area (approximately 40 feet by 10 feet). This area will be located generally around Monitoring Well MW-7S. Depth to groundwater is between 2 and 5 feet below grade in the area. Injection borings will be spaced on 10-foot centers in a grid pattern. In the area of highest PCE concentrations, the injection borings will be on 5-foot centers. A total of 82 injection borings are planned (Figure 4).

The average PCE, TCE, DCE and VC concentrations detected in monitoring wells and piezometers in the area, along with additional competing electron acceptor values and additional demand factors such as competing microbial processes and hydrophobic sorption were used to calculate the appropriate HRC application rate. Based on the software program provided by Regenesys, an appropriate application rate of 7 pounds per foot in each injection boring in the area of highest VOC concentrations and 6 pounds per foot in the injection boring in areas of lower VOC concentrations was calculated.

A truck mounted Geoprobe® hydraulic soil probing machine will be used to install the injection borings using 1.5-inch diameter steel drive rod fitted with an expendable steel point. Each boring will be driven to 19 feet below ground surface (bgs) and the drill rod was retracted in approximately 1-foot intervals to 4 feet bgs. The HRC-X material in 4-gallon buckets (30 pounds of HRC) will be heated a water bath to an approximate temperature of 120° Fahrenheit to increase the viscosity of the HRC. A Geoprobe® GS2000 pump or equivalent will be used to pump the HRC-X down the drive rods.

2.5 Groundwater Monitoring

All three monitoring wells (MW-5I, MW-6S, and MW-7S) along with all four piezometers (TP-1, TP-2, TP-4, and TP-SB-18) in the area will be sampled each month for the first quarter and quarterly thereafter. Low flow sampling techniques will be used where possible. Groundwater samples from all sampling points will be analyzed for VOCs by EPA Method 8260. Groundwater samples collected from the monitoring wells will be analyzed for nitrate, sulfate, methane, ethane, ethene, total organic carbon, chloride, ferric iron and dissolved manganese. All samples will be evaluated for selected field criteria (temperature, pH, redox potential, dissolved oxygen and conductivity).

2.6 Soil Monitoring

Approximately one year following injection, four soil borings will be installed with a Geoprobe to allow for the collection of soil samples for laboratory analysis. The soil borings will be located at the locations of previous borings SB-18, TP-5, SB-4, and SB-2. The soil borings will be offset at least 2 feet from an injection point to avoid sampling disturbed soil. Soil samples will be collected continuously from each boring and screened for VOCs using a photoionization detector. One soil sample from each of three depth zones (one to six feet; six to 12 feet; and 12 to 20 feet bgs) in each boring will be submitted for laboratory

analysis based on the highest field screening Photoionization Detector (PID) reading or other field observations. The 12 soil samples will be analyzed for VOCs by EPA Method 8260.

3.0 REPORTING

Following completion of the interim action, a report will be completed that documents the remedial activities, including a summary of site activities and laboratory analysis. Copies of the laboratory reports and sampling chain-of-custody forms will be included in the report.

4.0 REFERENCES

MACTEC Engineering and Consulting, Inc. (MACTEC). 2004. Enhanced Bioremediation Pilot Test Report For McDonnell Douglas, Hazelwood, Missouri. April.

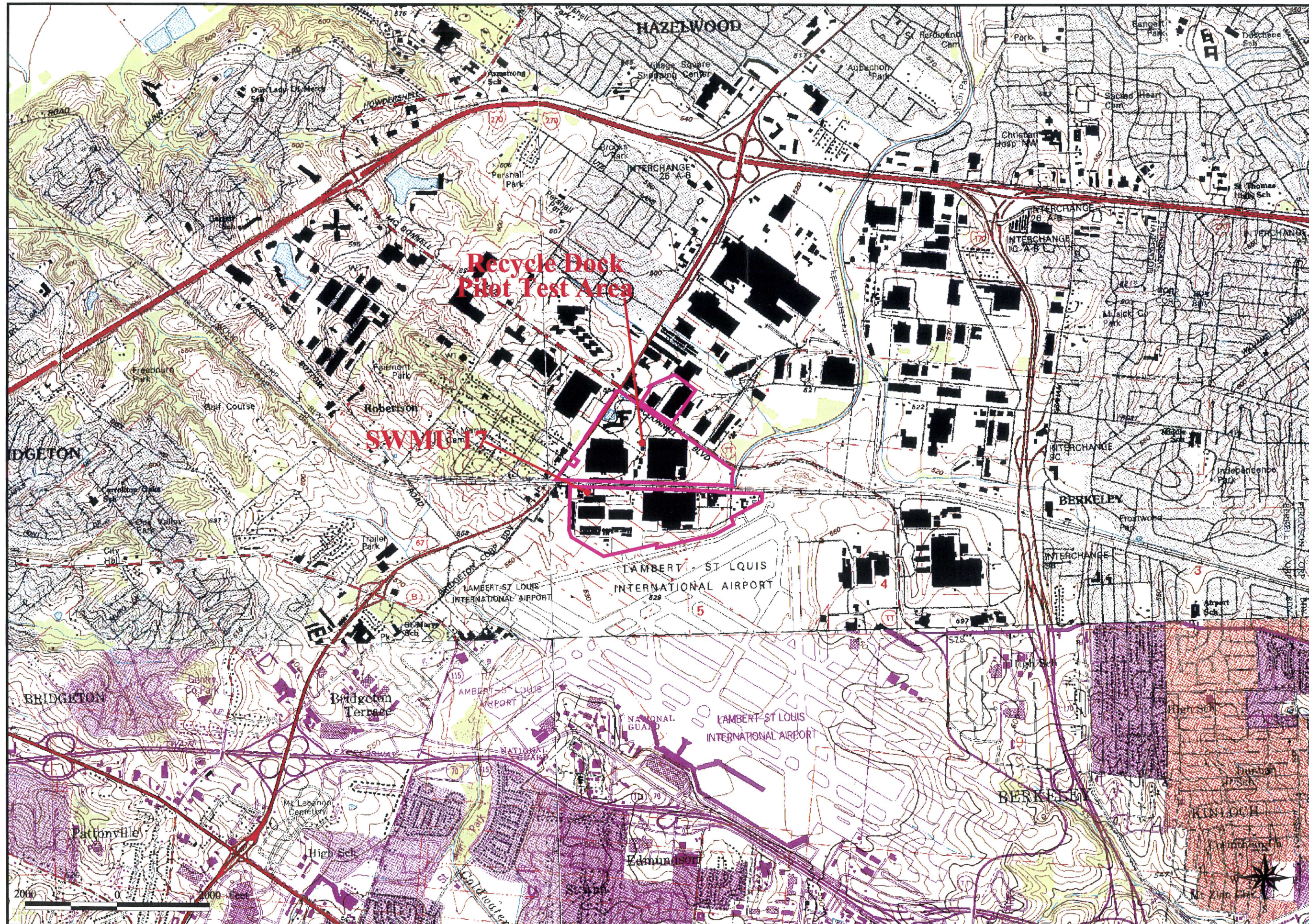
U.S. Environmental Protection Agency (USEPA). 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. September.

Figures

Figure 1
 Facility Location Map
 Interim Action Work
 Plan, SWMU 17
 Boeing Tract 1,
 Hazelwood, Missouri

Legend

 Boeing Tract 1



Source: USGS Clayton,
 Creve Coeur, Florissant,
 and St. Charles 7.5 Minute
 Quads.

Scale

1:24000





1" = 1000'

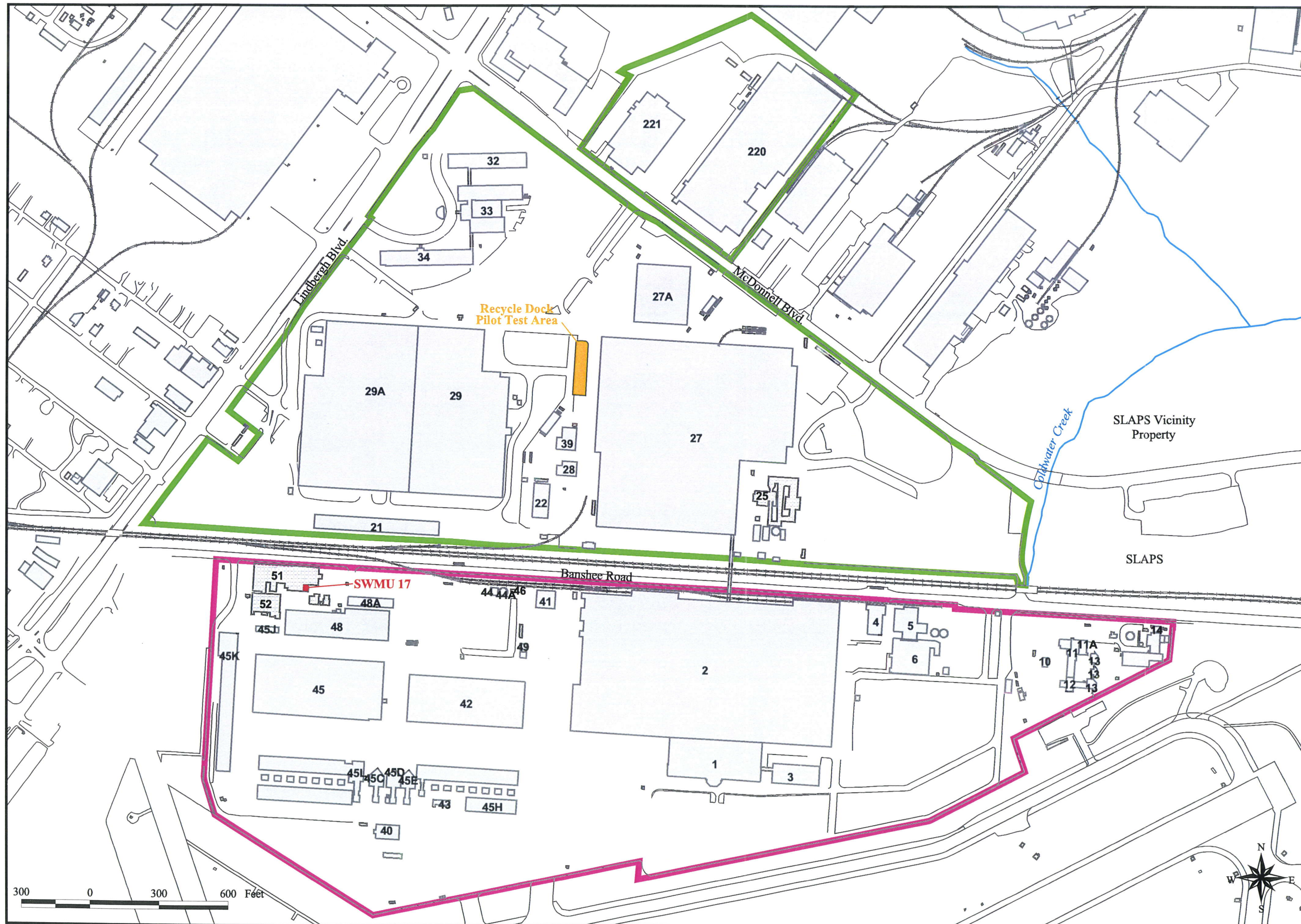
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 Checked by: Date: February 11, 2004

 MACTEC, Inc.

Figure 2
 Facility Map
 Interim Action Work
 Plan, SWMU 17
 Boeing Tract 1,
 Hazelwood, Missouri

Legend

-  Existing Building
-  Demolished Building
-  Boeing Tract 1 North
-  Boeing Tract 1 South



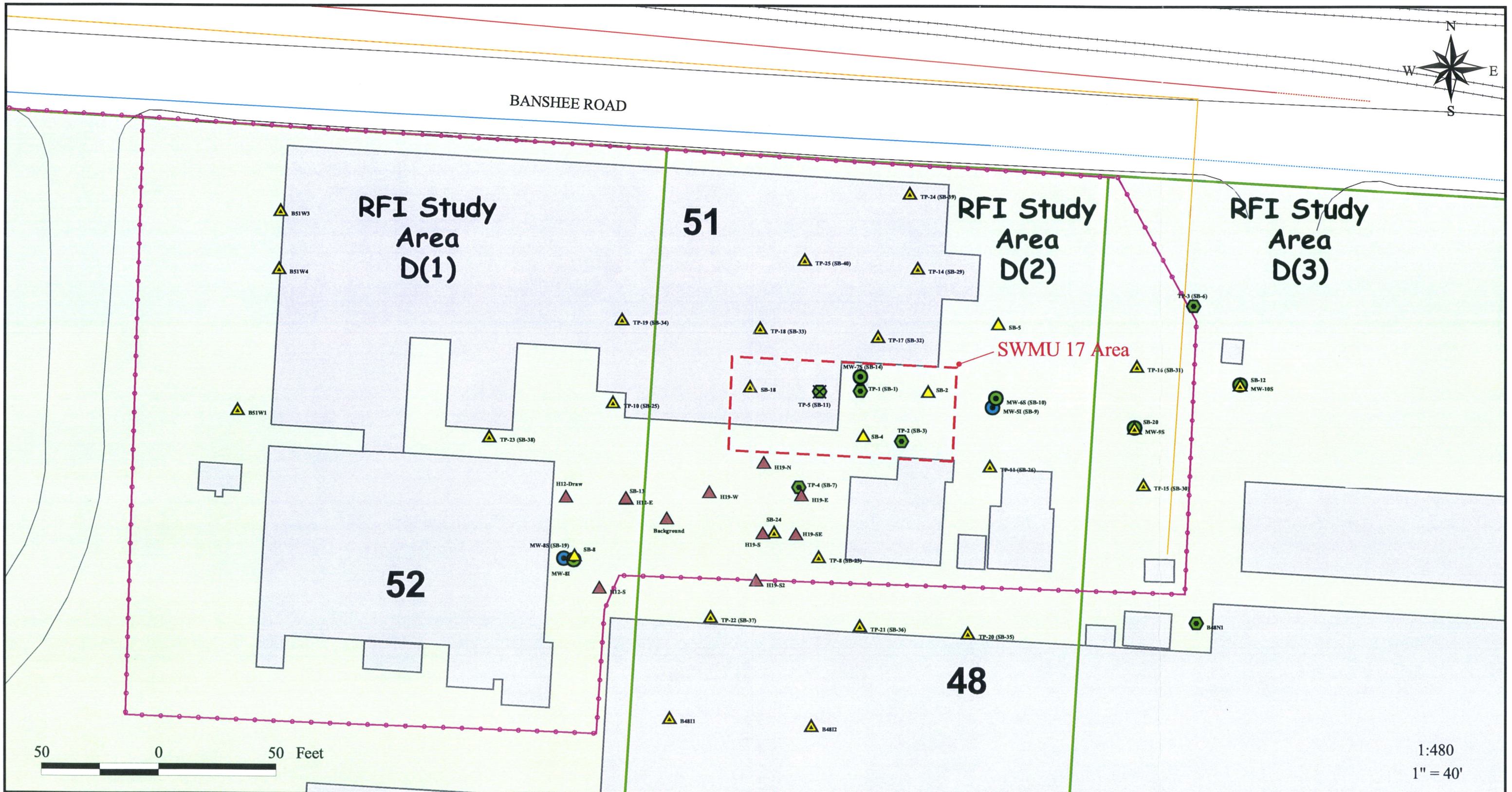
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1" = 300'

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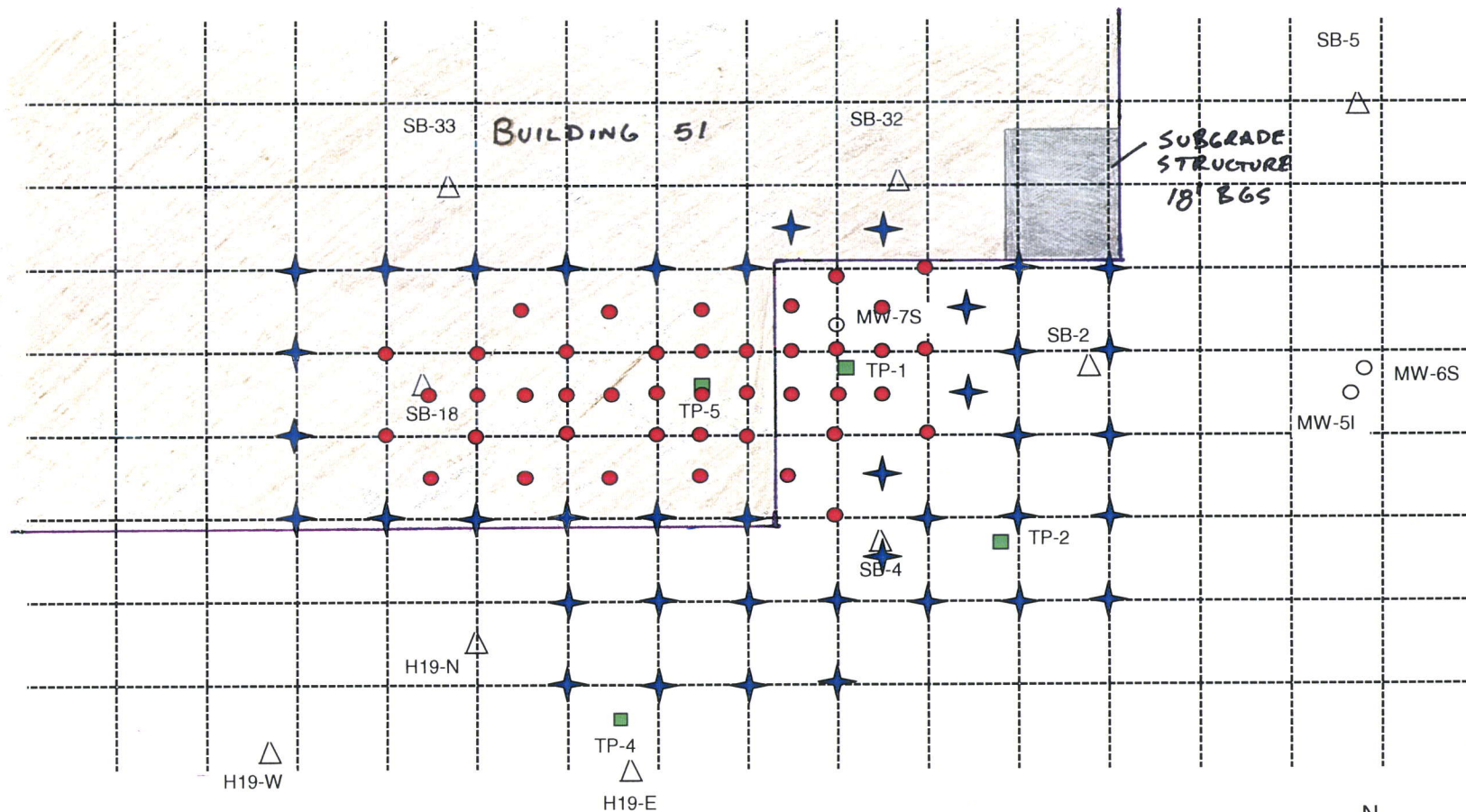




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Figure 3
 Site location Map
 Interim Action Work Plan, SWMU 17
 Boeing Tract 1
 Hazelwood, Missouri



Legend	
	- Soil Borings
	- Monitoring Wells
	- Temporary Piezometers
	6 lb per foot HRC injection point (40)
	7.0 lb per foot HRC injection point (42)

Scale
1" = 20'

Figure 4
Proposed HRC Injection Points
Interim Action Workplan, SWMU 17
Boeing Tract 1, Hazelwood, Missouri



INTERIM ACTION REMEDIAL WORK PLAN

Solid Waste Management Unit 17

**McDonnell Douglas,
Hazelwood, Missouri**

Prepared for:
The Boeing Company
St. Louis, Missouri



Prepared by:
MACTEC Engineering and Consulting, Inc.
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

MACTEC Project Number 32350035046

May 5, 2004

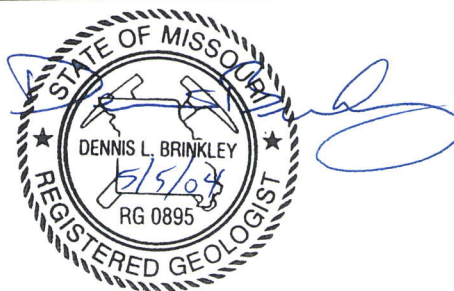
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Figures

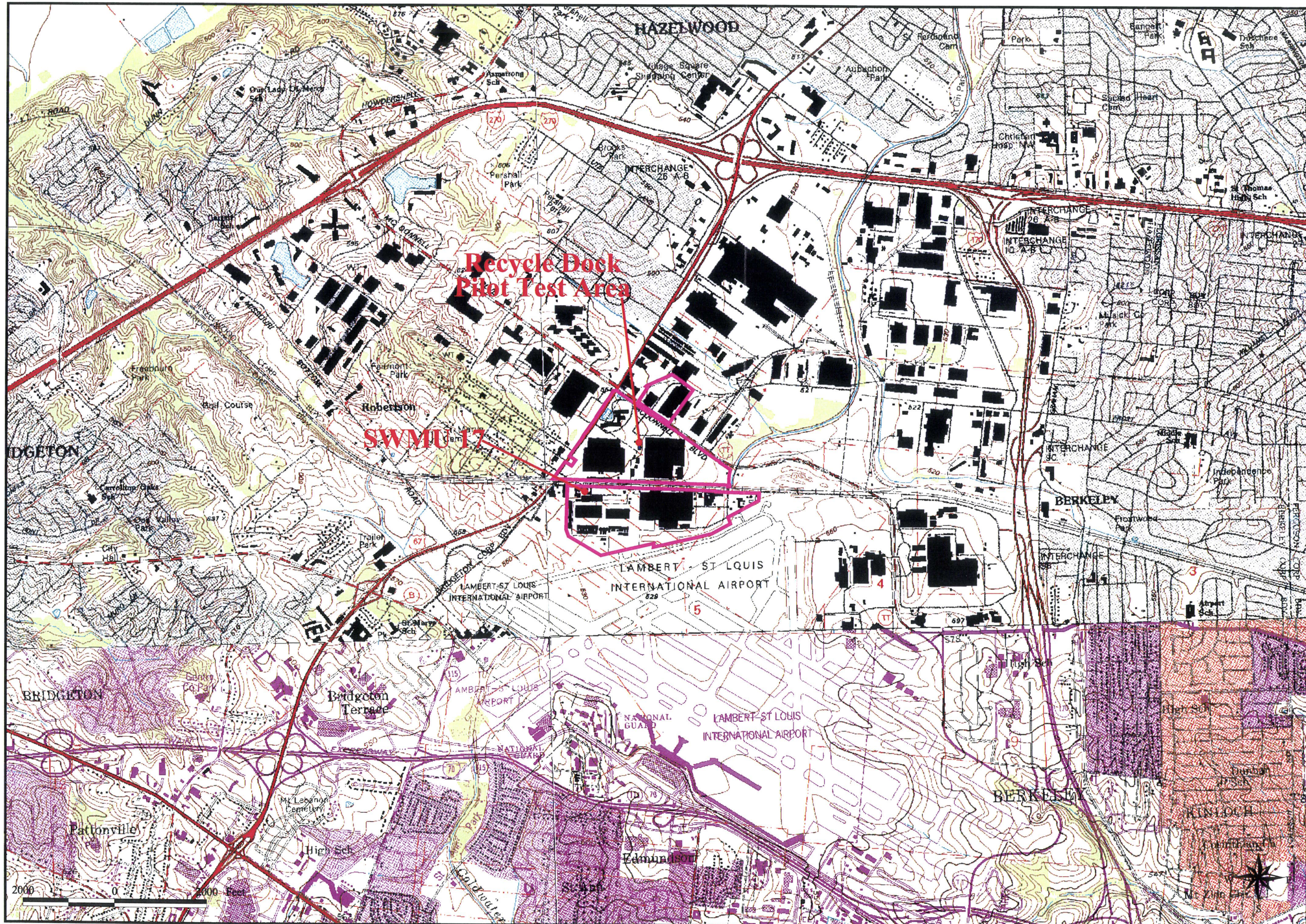


Figure 1
Facility Location Map
Interim Action Work
Plan, SWMU 17
Boeing Tract 1,
Hazelwood, Missouri

Legend

 Boeing Tract 1

Source: USGS Clayton,
Creve Coeur, Florissant,
and St. Charles 7.5 Minute
Quads.

Scale

1:24000





1" = 1000'

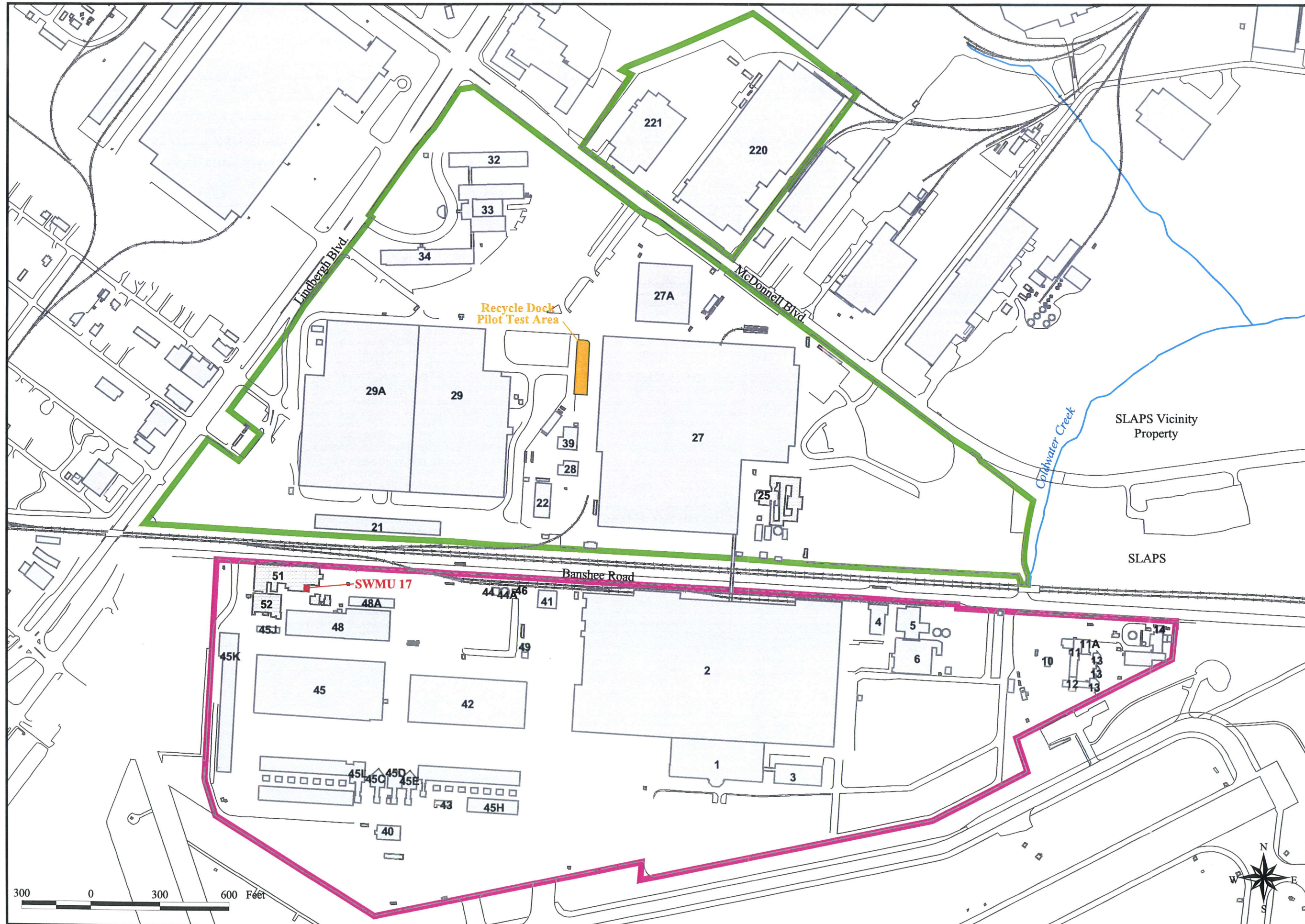
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Checked by: Date: February 11, 2004



Figure 2
 Facility Map
 Interim Action Work
 Plan, SWMU 17
 Boeing Tract 1,
 Hazelwood, Missouri

Legend

-  Existing Building
-  Demolished Building
-  Boeing Tract 1 North
-  Boeing Tract 1 South



Scale

1:4800
 1" = 300'

Drawn by: BSM Approved by:
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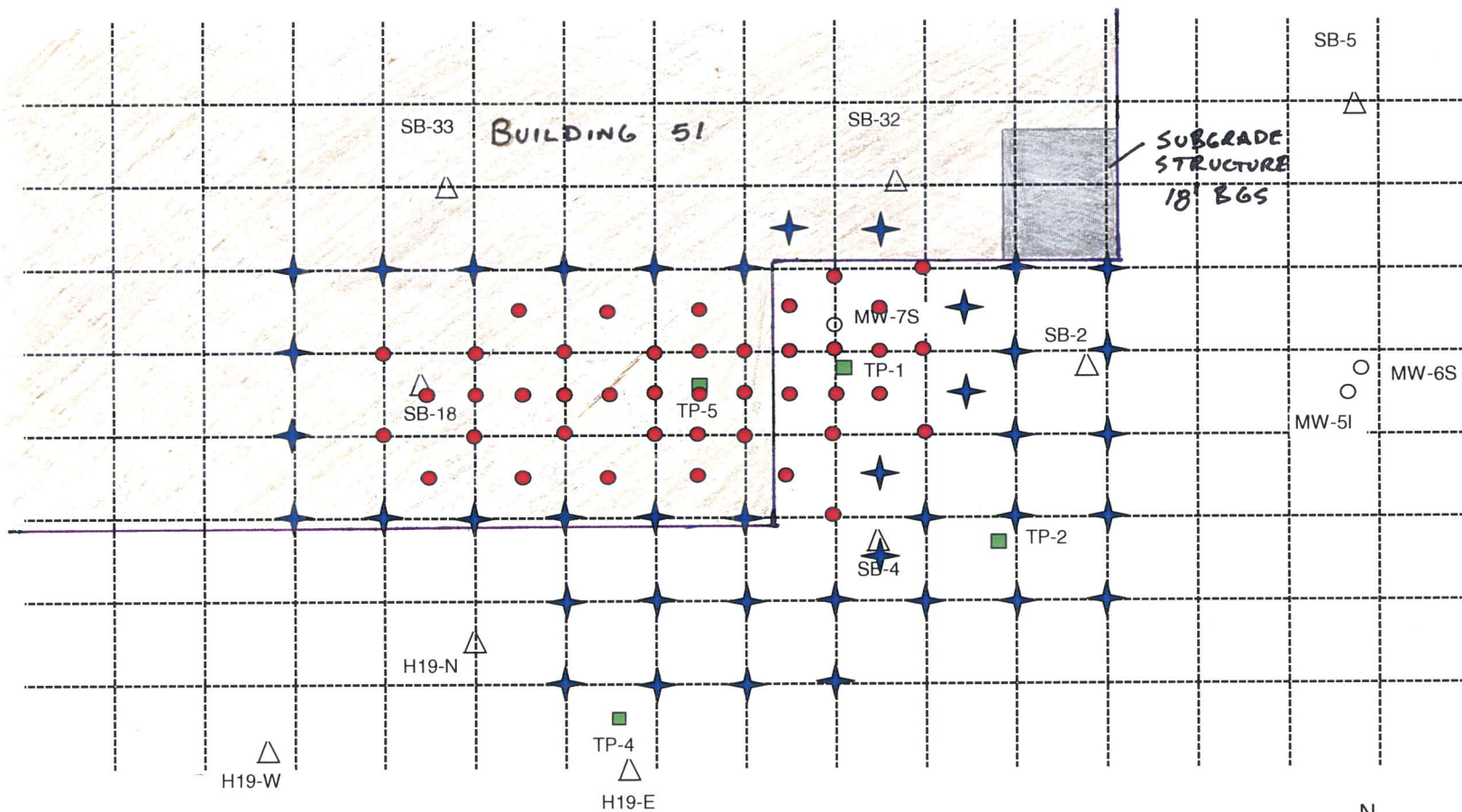


Figure 4
Proposed HRC Injection Points
Interim Action Workplan, SWMU 17
Boeing Tract 1, Hazelwood, Missouri

